

What Is Claimed Is:

1. A nanoscale grasping device for the manipulation of microscopic objects, comprising at least three electrostatically actuated grasping elements.

2. The nanoscale grasping device of claim 1 wherein said at least three grasping elements comprise a fibrous material.

3. The nanoscale grasping device of claim 2 wherein at least one of said grasping elements comprises a carbon nanotube.

4. The nanoscale grasping device of claim 3 wherein said carbon nanotube is grown by a chemical vapor deposition (CVD) technique. *process in product*

5. The nanoscale grasping device of claim 2 wherein at least one of said grasping elements is

chemically functionalized to bind specific molecules
to said grasping element.

PM Class II
Product

5 6. The nanoscale grasping device of claim 2
wherein at least one of said grasping elements is
chemically functionalized to bind particles to said
grasping element.

proc in prod

10 7. The nanoscale grasping device of claim 1
wherein each of said at least three grasping elements
is independently supplied with a voltage sufficient to
induce electrostatic forces between at least two of
said grasping elements, whereby to close or open said
grasping elements.

proc in post

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8. The nanoscale grasping device of claim 7
wherein a steady state voltage is applied to at least
one of said grasping elements.

proc in prod

9. The nanoscale grasping device of claim 7
wherein an oscillating voltage is applied to at least
one of said grasping elements.

prc in prod

5 10. The nanoscale grasping device of claim 9
wherein the oscillating voltage applied to at least
one of said grasping elements is in phase with the
oscillating voltage applied to at least one of the
remaining grasping elements.

See 9

15 10. The nanoscale grasping device of claim 9
wherein the oscillating voltage applied to at least
one of said grasping elements is substantially out of
phase with the oscillating voltage applied to at least
one of the remaining grasping elements.

See 10

20 12. The nanoscale grasping device of claim 1
wherein resonant vibration in said grasping elements
is cancelled by oscillating voltages applied to said
grasping elements.

See 1)

13. The nanoscale grasping device of claim 1
wherein resonant vibration in said grasping elements
is enhanced by oscillating voltages applied to said
grasping elements.

See 12

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14. The nanoscale grasping device of claim 12
wherein said resonant vibration is thermally induced.

See 13

15. The nanoscale grasping device of claim 12
wherein said resonant vibration is mechanically
induced.

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16. The nanoscale grasping device of claim 1
wherein said grasping device comprises three grasping
elements, and further wherein a steady state voltage
is applied to two of said grasping elements while the
remaining grasping element is left at a fixed voltage
so as to induce electrostatic forces between said
grasping elements, whereby to open or close said
grasping elements.

See 14

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17. The nanoscale grasping device of claim 18
wherein said fixed voltage is ground.

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5 18. The nanoscale grasping device of claim 1
wherein said grasping device comprises three grasping
elements, and further wherein an oscillating voltage
is applied to each of said three grasping elements,
with the phases of the oscillating voltages being
substantially different on all three grasping
elements, thereby inducing electrostatic forces
between said grasping elements.

See 17

15 19. The nanoscale grasping device of claim 18
wherein the oscillating voltage applied to each
grasping element is substantially 120 degrees out of
phase with its neighboring grasping elements.

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20 20. The nanoscale grasping device of claim 1
wherein said grasping tool comprises four grasping
elements, and further wherein a steady state voltage
is applied to two neighboring grasping elements, and

See 19

the remaining two grasping elements are left at another voltage.

21. The nanoscale grasping device of claim 20
5 wherein said another voltage is ground voltage.

See 20

22. The nanoscale grasping device of claim 1
wherein said grasping tool comprises four grasping
elements, and further wherein a steady state voltage
is applied to two diametrically opposite grasping
elements, and the remaining two grasping elements are
left at another voltage.

See 21

15 23. The nanoscale grasping device of claim 22

See 22

wherein said another voltage is ground voltage.

24. The nanoscale grasping device of claim 1
wherein said grasping tool comprises four grasping
elements, and further wherein an oscillating voltages
are applied to each of said grasping elements, with

See 23

20 each oscillating voltage being substantially 90

degrees out of phase with the other oscillating voltages.

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parts

5 25. The nanoscale grasping device claim 1 where said grasping device comprises n grasping elements,

wherein n is greater than 4.

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b20

26. The nanoscale grasping device of claim 25 wherein steady state voltages are applied to said grasping elements so as to induce electrostatic forces between said grasping elements.

See 24

15 27. The nanoscale grasping device of claim 25 wherein an n phase oscillating voltage is applied to each grasping element, substantially $360/n$ degrees out

of phase with said other grasping elements.

See 25

20 28. The nanoscale grasping device of claim 1, "adapted for"
wherein at least one of said grasping elements is adapted for use as a probe in atomic force microscopy

and scanning probe microscopy techniques.

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29. The nanoscale grasping device of claim 1,
wherein at least one of said grasping elements is
adapted for use in performing electrical and
mechanical analysis of the sample.

"adapted for"